¨ÉAUÀ¼ÀÆgÀÄ «zÀÄåvï ¸ÀgÀ§gÁdÄ PÀA¥À¤ ¤AiÀÄ«ÄvÀ (PÀ£ÁðlPÀ ¸ÀPÁðgÀzÀ ¸ÀA¥ÀÆtð ¸ÁéªÀÄåPÉÌ M¼À¥ÀnÖzÉ)

Bangalore Electricity Supply Company Limited

TECHNICAL SPECIFICATION FOR 8 METRES /9 METRES RCC POLES (115kgWL /145kg WL/150kg WL)

1.0 SCOPE:

1.1 The specification covers manufacture, curing testing and supply of 8.0 and 9.0 meters long RCC poles generally as per drawings enclosed with this specification, and are intended to be used on 11kv and LT overhead electric distribution lines.

1.2 Irrespective of anything said or omitted herein the materials shall be suitable for the purpose intended for and shall confirm to the latest edition of the Indian standard specification IS: 785.

2.0 MATERIALS

2.1 Cement: The cement used in the manufacture of RCC poles shall be any of the following:

1. 53 grade ordinary Portland Cement conforming to IS 12269 / 1987
2. Portland slag cement conforming to IS: 455 / 1989
3. Portland pozzolana cement: Fly ash based conforming to IS: 1489 Part 1 / 1991
4. Portland pozzolana cement: Calcined clay based conforming to IS: 1489 Part 2 / 1991
5. Rapid hardening Portland Cement conforming to IS: 8041 / 1990

2.2 **Aggregates:** Aggregates used for the manufacture of RCC poles shall confirm to IS-383. It shall be graded hard broken granite stones of size 10mm to 20mm. Under no case the size of the jelly shall exceed 20mm. The whole of the aggregate shall pass through a sieve having aperture not exceeding three quarters of the minimum distance between the main reinforcing bars. The sand shall be of the quality fit for use in RCC works i.e. river sand and sieved and free from alkaline / acidic materials.

Reinforcement: Reinforcing bars and wires used for the manufacture of RCC poles shall be as below:-

a) Mild steel medium, tensile steel bars and hard drawn steel wire confirming to IS: 432 / 1982 (Part I & II)
b) The steel of tor-50 grade, confirming to latest edition of IS-1786 / 1985.
c) Quality of MS rounds used for stirrups shall comply with the requirement of IS: 2062 / 1999.

The reinforcing bars used shall be of requisite length as per drawing and no joint shall be allowed. All joints and stirrups shall be welded properly. If not welded the lap length shall not be less than 40 times the diameter of bars. The cover of concrete over the main reinforcement shall be 30mm under the normal working conditions and shall not be under any circumstances less than 20mm. The surface of all reinforcement shall be free from loose scale, loose rust, oil, grease, clay or other material that may have deteriorating effect on the bond between reinforcement and concrete.

2.3 Admixture :- The admixtures, if used shall conform to IS: 9103.

2.4 Concrete:- The minimum grade of concrete to be used for the manufacture of RCC Poles shall be M 25 and shall comply with requirements of IS-456.

2.5 Water:- The requirement of water to be used for mixing and curing shall conform to the requirements given in IS: 456. Seawater shall not be used.

3.0 **STANDARDS:-** The standards adopted for various materials, design, manufacture shall be the latest version of the following:

1. The RCC poles shall conform to IS: 785 / 1998.
2. The quality of concrete shall conform to IS: 456/2000.
3. The testing of prototype poles shall conform to IS: 2905/1989.

4.0 DESIGN: -

4.1 The RCC poles shall be manufactured as per the enclosed drawings and as per the following details.

Sl. No.	Particulars	Type of RCC poles		
		8 Mtr. Rectangular section	9 Mtr. Rectangular section	9 Mtr. square section
1	Working load (Kgs) (Transverse)	115	145	150
2	Working load (Kgs) (Longitudinal)	-	-	150
3	Factor of safety	2.5	2.5	2.0
4	Depth of planting (Mtr.)	1.5	1.7	1.7
5	Size of Tor 50	10	10	12

	Reinforcement steel (mm)			
6	Size of MS round for stirrups (mm)	6	6	6
7	No. of Stirrups	56	60	60

5.0 MANUFACTURE:

5.1 The poles shall be manufactured as per the drawings enclosed. All reinforcements shall be accurately placed and maintained in position during manufacture. All buttons or chairs or other devices used to obtain the necessary cover shall be of corrosion resistant material. The cover for concrete overall reinforcement shall be atleast equal to the maximum size of aggregate plus 2 mm but in no case less than 20 mm or the figure indicated in the drawings whichever is higher.

5.2 Welding and lapping of reinforcement shall be as given in IS: 456

5.3 Form boxes shall be of the shape required and shall be so constructed as to maintain their shape during the placing and compaction of concrete. They shall be sufficiently tight to prevent loss of liquid from the concrete. Form boxes shall not be removed until the concrete has hardened sufficiently so that the surface is not marred by the removal of form box. Pole shall not be moved until the concrete has attained sufficient strength to withstand the stresses induced during de-moulding.

5.4 The form boxes shall be discarded and scrapped either after fabricating two hundred poles or when it is found deformed whichever is earlier. New form boxes will then be used afterwards.

5.5 The concrete shall be used as soon as possible after being mixed and no material, which has developed an initial set, shall be used in the work. After concrete has been placed in the moulds and compacted, it shall not be disturbed during the period of setting. For depositing concrete in hot weather, IS: 7861 Part 1/1975 shall be followed.

5.6 Concrete shall be compacted by spinning, vibrating. Shocking or other suitable mechanical means. Hand compacting is not permitted.

5.7 After placing, the concrete shall be adequately protected, during setting and in the first stages of hardening, from shocks, running of surface water and harmful effects of sunshine, drying winds and cold. The concrete shall be cured for at least 28 days unless special curing

methods are adopted, in such cases it shall be cured till the required strength is achieved. Steam curing of concrete may be adopted if so desired by the manufacturer provided the requirements of pressure or non-pressure steam curing are fulfilled.

5.8 The concrete when removed from the mould shall be of good finish and free from honeycombing. All arises shall be clean and true and shall present a neat appearance.

5.9 During manufacture, test on concrete shall be carried out as per IS: 456. The manufacturer shall supply when required by the purchaser or his representative, results of compressive test on concrete cylinders or cubes made from the concrete used for the poles. If purchaser so desires, the manufacturer shall supply cylinders or cubes for test purposes and such cylinders or cubes shall be tested in accordance with IS: 516.

5.10 EARTHING

Earthing shall be provided by having a separate length of 4 mm dia GI Wire embedded in concrete during manufacture and the ends of wire left projecting from the burrow end of the pole to a length of 100 mm at 215 mm from top of the pole and 150 mm below ground level. The arrangement for termination of the earth wire and fixing of the bolt and nut shall be as indicated in the enclosed drawings. The Wire used for embedding shall comply with the requirement of IS-2141/2000.

5.11 Provisions for holes for fixing the cross arms and other fixtures shall conform to drawing and for the construction practice adopted by BESCOM.

6.0 TESTING:

6.1 The poles are to be tested for factor of safety as per IS-2905. A Reinforced Concrete Pole shall be deemed not to have passed the test if the observed ultimate transverse load is less than the designed ultimate transverse load. In case of square pole of 150-Kg strength, the ultimate transverse and longitudinal loads are equal and both should be tested.

6.2 Poles made from ordinary Portland cement or blast furnace slag cement shall not be tested till 28 days after the date of manufacture.

6.3 The test for transverse strength, Torsteel strength, measurement of cover and uprightness shall be carried out in the presence of the representative of BESCOM.

6.4 Destruction Test: One pole out of a lot of 500 or less shall be subjected to destruction test to verify the steel and other aggregates used. No payment shall be made for the pole / poles which are subject to Destruction test.

6.5 Scale of sampling: In a consignment of 500 poles or part thereof the same mounting height, the same dimensions and belonging to the same batch of manufacture shall be grouped together to constitute a lot. For ascertaining the conformity of the materials in the lot to the requirements of this specification samples shall be tested from each lot separately. The number of poles to be selected from the lot shall be as per Table – 2 of IS: 785/1998 and as follows.

Total No. of Poles in the Lot	No. of Samples to be selected for Testing	Permissible number of Defectives in Dimensional Requirements	Number of poles to be selected for Transverse Strength Test
1	2	3	4
Up to 100	10	1	2
101 to 200	15	1	3
201 to 300	20	2	4
301 to 500	30	3	5

6.6 All the Poles selected in accordance with the above clause shall be tested for overall length, cross-section, uprightness and finish. A pole failing to satisfy one or more of these requirements shall be considered defective. All the poles in the lot shall be considered as conforming to these requirements if the number of defective poles found in the sample is less than or equal to the corresponding acceptance number given in column 3 of the above table.

6.7 The lot having been found satisfactory accordingly shall be tested for transverse strength of the poles in accordance with clause 6.1. For this purpose, the number of poles given in column 4 shall be tested, these poles may be selected from those already tested according to the above

clause and found satisfactory. All these poles tested for transverse strength shall satisfy the corresponding specification requirements. If one or more poles fail, twice the number of poles originally tested shall be selected and subjected to this test. If there is no failure among poles, the lot shall be considered to have satisfied the test.

7.0 GUIDE LINE FOR TESTING OF R.C.C. POLES:

1) Check all reinforcements for their proper dimensions and cover (cover shall be 30 mm.) Skeleton requirements may be checked for the dimensions of MS rod and stirrups. It should be as per the specifications and the drawings.
2) Ascertain the quality of sand, jelly and cement used. (Jelly size shall be 20mm.)
3) Satisfy of the curing arrangements made in the centre.
4) Pole should be visually inspected for physical dimensions as per drawing and visually checked for any crevices, cracks rough surfaces or any other defects. It should be straight and free from any bends.
5) The two holes at the top should be checked for 18 mm clear hole and suitability for fixing single top supports may be checked on as many Number of poles as possible.
6) The GI Wire embedded should be of atleast 8 SWG and of good quality galvanization. The length of the wire left outside the pole should be as per the specification of the drawing.
7) The pole should be mounted horizontally on the test bed keeping one pole 'FLAT' on the bed for longitudinal: Cantilever test as per IS-2905.
8) Keep the depth of planting at 1.5 meter for 8 metre poles and 1.7 meters for 9 metre poles.
9) The load should be applied at 600 mm, from the top in either case.
10) Fix the Dynamometer and the wrench or chain pulley block for longitudinal test.
11) Note down the initial reading of the scale.
12) Now gradually start loading, step by step at various loads, as indicated below and measure the permanent set.
13) The pole is loaded to a maximum of 2.0 times (Factor of safety) and held in position for 2 minutes.
14) For each loading the pole is examined for any hair cracks at depth of planting, if necessary by wetting the pole for proper visibility.
15) After the last reading i.e. full load the cracks developed should completely close (without any sign of crack) on release of load. Also the pole must return to the original position without any appreciable deflection. Also there should not be any visible

distortion of pole from the original position. Otherwise the pole should be considered as a 'Failure'.

8.0 MARKING :

8.1 The poles shall be clearly engraved and indelibly marked with the following particulars during manufacturing, at a position so as to be easily read after erection in position.

a. Month and year of manufacture
b. Makers serial No and make
c. Position of centre of gravity of the poles with the words "C.G."
d. A line to indicate depth of planting.
e. Engraved letters BESCOM.
f. P.O. No. / Date
g. Any other details as specified.

General Manager (Ele)
QS&S BESCOM